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PURPOSE AND MECHANISM IN PSYCHOLOGY

THERE are present signs of a division of psychologists into two schools, one professing that teleological explanation is fundamental in psychology and the other committed to the language of the physical sciences and their ideals of mechanistic description. The majority of psychologists use the two forms of explanation side by side. Even the most intransigeant behaviorists use explanations which, although they speak of forces and motion, impulses and mechanisms, turn out on closer examination to be disguised purposes.

Obviously both forms of explanation have the same basis, namely, observation. One is as empirical as the other. When Professor McDougall asserts that all mechanistic explanations of learning are failures, he has before him the same experimental evidence that has stirred others to the formulation of these same mechanistic explanations. The fact that he has demonstrated that one form of mechanistic explanation of trial and error learning is inadequate will not prevent others from being devised, and it may be assumed that Professor McDougall will attack these in their turn.

What are the essential differences between purposive explanations and mechanistic explanations? Both have the trait common to all explanations in that they consist of assigning a fact or an event to a category of some sort. When I asked a six-year-old why a nearby boy had just pushed a small girl off the walk and was told, "Oh, she's his sister," I had my explanation and a perfect understanding with my informant. I suspect this explanation of being teleological, for it is certainly not mechanistic. The event had been assigned to its class, a brother-sister relationship somewhat neglected by the Freudians. We explain the fall of the apple, or, better, would explain it, for it is an explanation for which I have not yet been asked, by saying that any object would fall if not supported, or, if we are physicists and more precise, by answering that any two masses undeterred by other forces, approached each other at a rate whose acceleration equals the product of the masses times a constant divided by the square of the distance. Professor McDougall explains our weeping on seeing another weep by saying that this is an instance of primitive sympathy, an original trait of human beings. Molière's physician's reply that opium puts people to sleep because it is a soporific has served for many years as an illustration of what

an explanation should not be, but I am not sure that it will not equally well serve as an illustration of the sort of thing every explanation is. I hope that I shall not be asked Molière's question, since the only reply I know is in such bad repute.

Both mechanistic and purposive explanations consist in assigning a fact or an event to its class. They have another point of likeness in that both have departed from primitive meanings and extended the scope of their generalizations. It is clear that the biological sciences in their use of such purposive categories as adaption, survival, growth, and the like, do not refer to the more primitive notion of a conscious and personal purpose. These sciences need have no hypotheses concerning the nature of consciousness, or, indeed, concerning the existence of purposive agencies bringing about the events explained. When a psychologist explains that the human infant begins to walk about the end of the first year because of the maturation of his nervous system he is using a strictly purposive explanation, because he knows practically nothing of the details of maturation and only knows that it is a result which experience enables him to predict as normal. The biological sciences need have no hypotheses concerning the existence of purposive agencies bringing about maturation. Their terms like maturation need not, and as a rule do not, represent anything more than characters of the events themselves. Purposiveness in an event may mean nothing more than its utility-achieving quality. Even purpose in the strictly psychological sense of conscious intention may be regarded as a character of consciousness and not as an effective agent.

Mechanism has likewise departed from its primitive meaning. Modern mechanisms are not built up about the notion of action by impact. They have been extended beyond the conception of neat and absolute laws prevalent in the eighteenth century. Dr. Watson's explanation of the fixation of useful responses into habit is criticized by Professor McDougall as a mechanistic explanation, although it makes no attempt to follow the effects of stimulation through the nervous system. Its mechanistic character lies in the fact that it is based on the past frequency of an event and not on the need served. The term "mechanistic" now embraces explanations based on statistical method with probabilities and probable errors.

Mechanistic and purposive explanations have three essential differences. One of these is that purposive explanations, unlike mechanistic explanations, are applied to events which experience shows have occurred under varying circumstances, with different antecedent conditions. Mechanistic explanations are applied to series of events in which the antecedents are comparatively fixed.

Recovery is an end result that follows on many different events, cuts, burns, bruises, diseases of many sorts. Medieval physicians explained this recovery through the *vis naturæ curatrix*. Bergson argues that evolution is occasioned by a purposive *élan vital* from the fact that the same type of eye has been developed in mammals and in the octopus, two very different lines of descent. The outcome is the same, but the paths by which it is reached are different.

In a second respect the two forms of explanation have a decided difference. Purposive explanations leave room for indeterminism. The outcome is not certain. Purposes are the sort of thing that gets done in spite of opposition. When a certain group of circumstances is invariably followed by a particular result, only an occasional theologian would apply to this result a purposive explanation. A description of an invariable sequence, or of a sequence which occurs in a numerically expressed proportion of the cases, is just what we mean by a mechanistic description. Its statement is an explanation of the outcome. Purposes have a probability less than certainty, but this probability is not expressed quantitatively.

In a third respect, namely, the occasion for their use, purposive explanations have a great initial advantage over mechanistic explanations. The events to be explained have as a rule been described in terms of purpose. The events that demand explanation do this by virtue of their human importance, or by an analogy with human values. Plato called attention to the fact that most definitions are descriptions of a use served and not of physical features. Just as a pencil is defined by its use, so most of the items of human behavior and thought which the psychologist must explain are most naturally described in terms of purpose. Eating, walking, speaking, deliberating, are purposively described at the outset. They are general terms for events whose character may differ enormously in different instances. We swallow, but do not eat, the stomach pump. We may make a noise with our vocal apparatus without speaking. Deliberation must have an aim. A world from which purposes were excluded would have no occasion for explanation of any sort.

These events which have been purposively described take naturally to purposive explanation. Both types of explanation consist in assigning the event to be explained to a class of similar events. The apple falls toward the earth because every pair of physical objects will, under similar circumstances, approach each other. The dog seeks food because all living creatures do this. He prefers meat because he is one of the carnivora. Human needs, being readily describable only in general terms and not in exact details of time and space, can obviously be given mechanistic explana-

tions only after being given mechanistic descriptions, which are in most cases impossible.

Spinoza made an attempt to reconcile purpose and mechanism by pointing out that purposes are achieved by means of mechanism. A free man was one who lived according to the dictates of reason alone, though this reason was itself subject to determinism. An end might be attained by any one of several means. Whether or not it was attained, however, depended on a rigid sequence of causes. "All final causes are merely fabrications of men." The mechanistic order was fundamental.

Spinoza's "reconciliation" of purpose and mechanism had no popular success. It is hard to persuade anyone but a professional philosopher that the adoption of a rigid determinism does not conflict with free will and purpose. If mechanism rules, purpose does become a superfluous description, because the assumption of purposes in the world carries with it the assumption of free will and indeterminism. The existence of design in nature is generally taken to be proved when it can be established that nature exhibits recurrent events or structure which could not have been predicted as the necessary consequence of natural laws. Common sense has never deserted purpose for mechanism. Ordinary men and most scientists are aware that their purposive explanations are often necessary and useful.

The popular failure of all attempts at a reconciliation of purpose and mechanism, or, rather, a reduction of purpose to mechanism, is due to the fact that they disregard an important practical consideration, namely, that we can not only describe, but we can also predict, events in terms of purpose in cases in which we have practically no inkling of the nature of the mechanism, of the nature of the detailed series of events leading up to the accomplishment of a purpose. This practical consideration is well brought out in Haldane's lectures on "The New Physiology" where the case for purposive explanation is based on its usefulness. We are able to predict that the addition of water absorbed in the alimentary tract by the blood stream will be compensated for by the action of the kidneys, although we know practically nothing of the nature of this action. We may predict that the blood temperature, the hydrogen ion concentration of the blood, and many other normals or states of equilibrium in the body, will be maintained, although we know only a few details concerning the means by which this will be accomplished. Haldane's point is that here we have end results whose probability is high, though we are not at all able to describe the ways in which they will occur or the series of events leading up to them. Haldane thus offers the apparent anomaly of a man who, as a philosopher, holds

purposive description necessary, and who, as a physiologist, has made most of his contributions in the direction of mechanistic explanations. His conception of physiological states of equilibrium whose disturbance causes their own re-establishment, whether through a known mechanism or by unknown means, is an enlightening one and his contention that in physiology the maintenance of an equilibrium, such as the proportion of blood salts to blood volume, is predictable, even though we do not know how the kidneys accomplish this, is a striking statement of the case for purposive explanation.

Haldane has called attention to the matter of predictability. He has, however, neglected an important matter connected with prediction in terms of purpose. Prediction in terms of mechanism and prediction in terms of purpose are two different things. A mechanistic prediction is intended as absolute, or fixed within numerically definite limits. If we double the pressure of a confined gas we shall find its volume halved. When psychologists believe they have discovered that a certain stimulus is under given conditions uniformly followed by a certain response, they speak of reflex mechanisms. Prediction in terms of purpose, however, always expresses a doubt of the outcome. Ordinarily this doubt is taken for granted when we speak of purposes. We may almost say that the essence of purposes is that their outcome is doubtful. No animal always survives. The blood temperature often fails to be reestablished. The percentage of CO_2 in the alveolar air is not always maintained at its equilibrium. Self-preservation in the individual, reproduction and the maintenance of the species, are end results which have no assured success. The social psychologist may point out that men have an instinctive disposition to get food, but individual men express doubt in its efficacy by praying for their daily bread. Purposes, we may repeat, are essentially defeatable and uncertain. The outcome that never fails is not described in terms of purpose.

There are a host of psychological terms embodying purposive description and explanation. The use of the "self" as explanation is an instance. Behavior which always and invariably follows a certain stimulus is not attributable to the self. Starting at an unexpected noise, sneezing, coughing, and most simple reflexes are listed by the ordinary man among the things *he* could not help doing. In popular usage the self is an explanation for those creditable and praiseworthy acts that could not have been predicted with certainty of a man in our position. It is I myself who win the tennis game, but a rough court, a poor racquet, or a too skillful opponent that loses the game. Our discreditable performances are blamed on a mechanistic "not-self" which must have acted as it did because the

act was unavoidable under the circumstances. The ordinary man is a follower of Professor McDougall when he is explaining his praiseworthy acts and a disciple of Dr. Watson when he is explaining his slips.

Another purposive category is instinct, which is still understood by most writers after the fashion made popular by William James and still more popular by Professor McDougall. Instincts are innate abilities to attain certain results such as reproduction, shelter, supremacy. These results are predictable in a general way but open to doubt. They do not operate mechanically, for they sometimes fail, and it is this doubt of their advent, together with a certain likelihood of their occurrence, that has compelled men to explain them in terms of purpose and not mechanism. They have a certain probability irrespective of the means by which they are brought to pass. At the end of the day the dog will have eaten, a probable event, though the means by which he will have attained food may be extremely bizarre, and their antecedent probability much less than that of feeding.

In the past, and among most psychologists of the present, learning has been explained in terms of purpose. "Random movements occur" is the opening of the explanation in many text-books, an opening which shows the psychologist not hostile to indeterminism. "Through trial and error the useless movements are eliminated," is the conventional second statement. An occasional text-book is contented with this, leaving it to be taken for granted that effects in accord with the organism's purpose will sustain the preceding movements, and effects not in harmony with purpose will act adversely on the preceding movements. Psychologists have ordinarily been more definite and held that original "random movements" are preserved or not, according as they result in pleasure or in pain. This is somewhat more specific as to the purposes served. We come nearer agreement on what gives us pleasure than on what we were made for. The means by which pleasure accomplishes the fixation of habit remain undiscussed.

This was the state of the explanation of learning when William James wrote. Since then, Thorndike has made it more definite. The original movements (no longer regarded as random but as specific responses to stimuli) are eliminated or not, according to their effect, not on consciousness or on the organism as a whole, but on neurones. The neurones are satisfied or annoyed, and the movements correspondingly preserved or eliminated. Refusing any longer to regard the original movements as random was a departure in the direction of determinism and more exact prediction. Knowing the specific stimuli and the sense organs affected, the specific

responses appear to be more exactly predictable. But passing from the effect on the organism to the effect on neurones leaves us in the field of purposive description, since it is sufficiently vague what sort of things satisfy or annoy a neurone. Specifying that neuronic satisfaction is gained through the action of mechanisms that are "ready" to act and annoyance through the action of mechanisms that are not in readiness, is not being more precise concerning just which action will be preserved and which not.

The important thing concerning all these purposive explanations, the self, instinct, learning through pain and pleasure, is that they are valid and serviceable up to a certain point. They have had centuries of successful use. They are convenient descriptions of human behavior and undoubtedly have predictive value. It is generally profitable and necessary to assume that men have moral and reasonable selves and to appeal to such selves. This assumption underlies all systems of ethics and jurisprudence. No selfless psychology has affected its standing in common sense in the slightest degree. Freudian psychology stands much nearer to common sense on this issue than does scientific psychology. Mr. Haldane's notion of normals that tend to be maintained by some means or other has its analogue in the Freudian notions of defense mechanisms, which are mechanistic in no proper sense, and in the Adlerian theory of "organ inferiority." These assume certain normal states of self-esteem or gratification (rather vaguely defined, it is true) whose disturbance brings about compensating action which restores equilibrium. The restoration of equilibrium is highly predictable and the means not so. No one can deny that all this does in fact occur.

It is also profitable to assume that men act from instincts. The popularity of William James' and Professor McDougall's description of instincts lies in the fact that it is not new, but is merely a codification of common sense. It uses a type of explanation to which men are habituated. Psychologists' attempts since Spencer to substitute mechanistic explanations in terms of serial reflexes have not won a popular hearing and have not even made headway among allied sciences like pedagogy, sociology, and political economy, and the reason is that we have a rough prediction of human behavior in these lists of instincts, even when they include modes of behavior which obviously involve learning and are dependent on experience. A psychologist can easily arouse hostility in any audience of non-psychologists by attempting an analysis of mother-love in terms of reflexes and practice.

We may, furthermore, act on a pleasure-pain theory of learning with general success. Rewards and punishment have been measured out on this theory with fairly gratifying results. There

is no doubt that the pleasure-pain theory is practical in a rough fashion.

Purposive explanation is not limited to the acts of living creatures. It is frequently applied, and not in any metaphorical sense, to the behavior of machines. Instruction books for unsophisticated automobilists tell what the machine is intended to do, what the buttons and levers are for, not going into detail as to how they work. This is quite sufficient until their manipulation fails to elicit the end result, in which case a more elaborate description is necessary.

The word "tendency" has been the refuge of the psychologist who disliked to commit himself to the expressed indeterminism of purposive explanations. It has the advantage that it can be assigned degrees of quantity. There are strong and weak tendencies, tendencies whose probability is high and tendencies whose probability is low. Tendency is really a neutral term lying between mechanistic and purposive description, and its use is an indication of an ambition directed toward more exact prediction.

What should be the psychologist's attitude toward the two types of explanation. I believe that the answer is dictated by the matter of prediction. The ideal should be an increasing ability to forecast behavior when the situation and history are given. There is no hard and fast line between purposive and mechanistic description, but there are degrees of accuracy in prediction. Let explanations be judged solely by their value in prediction. The human situation is so complex, individual differences so great, environmental factors so various that we are, perhaps, condemned to describe most behavior in terms of purpose, to allow for an indeterminism that is founded on the impossibility of recognizing all the causal factors. We are limited to the use of terms like tendency, disposition, adaptation, by the nature of the subject-matter. This defect of the science should not be exalted as a virtue, however, and painstaking observation of the quasi-uniformities that are offered us should not be discouraged. The principle of the conditioned reflex, now only to be described as a statement of a vague tendency, will become more enlightening and useful when experiment has made of it a body of detailed rules. Certain classes of responses are being found readily conditionable on certain classes of stimuli and not on others. Practice effects must be considered. The time elapsed before repetition must be considered. We shall then be in a position to predict certain conditioned responses with high accuracy and to assert that certain others have a very slight probability. Absolute prediction will never be reached. It can, however, mark the direction of progress, and to be satisfied with a description in terms of purpose which

disregards the quantitative statement of probability discourages advance.

To glory in the use of purposive explanations instead of mechanistic explanations is as pointless as to engage in a campaign for the elimination of purposive explanations from our science. The economist may be contented with the general statement that men tend to eat. Men, however, do not always eat even when confronted by food and starving. The psychologist who is faced with a case of anorexia must interest himself in a more exact description of the circumstances under which men eat or under which men do not eat. He must move in the direction of more exact prediction and hence in the direction of mechanistic description.

Similarly, instead of being contented with the principle that men have a primitive and original tendency toward imitation, we should examine the circumstances under which men imitate and the circumstances under which they fail to imitate. Writers of popular songs have more psychological acumen than psychologists. Out of "My bonnie lies over the ocean" can be made a song about bananas which is easy to whistle and hard to forget. The public does not know why the new air is "catchy," nor does the psychologist, but the writer and the publisher knew that a generation of previous practice is an advantage to any song and almost a condition of its spreading use. As long as a light switch turns on the light when desired we may be contented to know only that that is its purpose. When it fails to turn on the light we must consult someone who knows more than its purpose, who knows under what circumstances it will operate and under what circumstances it will not, in other words a mechanic. Not all mechanics are mechanists. I have heard profane teleological descriptions of an obstinate machine. But the better sort of mechanic tends toward mechanistic descriptions. And I am inclined to think that the better sort of psychologist is the psychologist who is not contented with any of his laws and principles because none of them are sufficiently precise to suit him. He will never be contented because his laws will never be absolutely precise, but he is more apt to have contributed to their relative precision than the psychologist who is satisfied with the vague indeterminism of purposive descriptions.

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ECONOMICS AND ETHICS

I.

THERE is sufficient need for discussion of economics and ethics: their relations. And so American economists naturally were interested in the appearance of a book with the very relationship expressed in the title.[1] There have been numerous excursions lately into the realm of conduct. Indeed, an anxious searching of motives, of aims, of the potentialities for good of the frankenstinian congeries of industries that make up the modern system has been the most conspicuous feature of several decades of *unorthodox* economic theorizing. The labor problem, the agricultural problem, problems of valuation, the reorganization of the employer-employee relationship, the recasting of mechanisms of exchange, the melioration of the damage done by the business cycle, the exploration of the possibilities of governmental aid and ownership, all these have seemed to the younger generation of American economists—of British economists too, for that matter—so burdened with the implications of human tragedy or joy that the impulse to search for the right ethical guide among their facts simply could not be denied. And this work has been pushed forward at what in retrospect seems an amazing pace notwithstanding the whirlpool of war that sucked all young men into its flood and held them there for years. But no one had yet ventured the grand generalization that was needed—a new system of conduct for a new age. And this was because the time was not yet ripe, perhaps. For the processes of regrouping were still operating and no one knew certainly where his economic affiliations really lay and what conformities were expected of him in the interest of his group. The passionate impulse to be rightly adjusted and to do whatever might be necessary at however great a personal sacrifice for the accomplishment of this end was conspicuously frustrated. What is it to be good? The younger economists must at least be credited with anguished effort to know in a world that was indifferent.

II.

And why was the world indifferent? Well, because it hadn't the facts yet that the young economists had uncovered. Or, rather because it hadn't them assimilated to its motive centers. The old gen-

[1] *Economics and Ethics* by J. A. R. Marriott, Dutton & Co., 1924. This book is sub-titled "A treatise on wealth and life." Mr. Marriott is honorary fellow at Oxford and a former member of Parliament.

eration hadn't any of this anguish because it knew how to be good. To be sure ways of being good were numerously held. Most conspicuous among them were the two orthodoxies of individualism and socialism. On the one hand, you didn't steal or perform any of the other proscribed acts of the decalogue; or, on the other hand, if you accepted socialism, you joined in the class war with the workers against the exploiters. And you could feel that you were getting closer all the time to your particular heaven.

Experimental economics hadn't yet got a name when the war engulfed all minor ethical quarrels in its holocaust of wickedness. With what singing hearts we gave up the struggle to define rightness and delivered our souls to the moloch! But it was illusory. The inner gnawing began again and persists with its own intervals and intensities.

And what happened to individualism and to socialism? Noisily and clamorously after its fashion, but strangely unnoticed, industry outgrew these categories of the nineteenth-century scholars, demonstrating what had nearly been forgotten by the generation that made them, that, after all, they were only categories. Painful as it was to them after the schooling most of them received, the young economists learned finally that you couldn't be good by not stealing — at least not good enough to satisfy your own analytical self, though it might satisfy the church—nor could you be good by believing in and working for the ownership of the tools of production by the state—not good enough, that is, again, to suit yourself when you had learned to distrust profoundly the state and all its works, it being, again, as it existed, only an institutionalized category of an antiquated sort. They learned that to be good you had to examine the whole groundwork of modern reality bit by bit, but also *in the whole*, for it functions coördinately; and to try to see as many as possible of the implications of its operation. Only after these cloudy crystals were after some fashion finally precipitate, could one begin to say, let's go here or let's go there, let's direct this force in this direction, and that force in the other; and only at long last one might hazily say, "this, I think, ought to be done by me, by you, by our group here, which I shall delimit by its functioning."

III.

Not one of the younger economists has got to his ethical synthesis. The most anyone is willing to say of industrial conduct is: "It seems to me, if the facts are as I understand them, that it might perhaps be better to do this than to do that because the results as I project them seem likely to be so and so." With what high expectations,

then, do they perceive the publishers' announcement of a book called *Economics and Ethics: a treatise on wealth and life.* And with what profound disappointment they discover that the book is only another attempted reconciliation of the Christian code with an anti-christian competitive capitalism. For that, indeed, is what it is.

The announced theme is stated thus: "Between the laws of wealth and the precepts of morality there is, in last analysis, no contradiction." One, however, who, looking about the world, sees "laws of wealth" in operation and "precepts of morality" tortured into their service, expects the theme to develop in a certain fashion; and, majestically, it does: "But ethical practice is conditioned by the operation of economic law, and . . . the wages of disobedience is death." Younger economists had almost forgotten that men could discourse quite seriously like that. They may not care to be reminded; but if they do, the full flower is here. For Mr. Marriott, who thinks that Francis Walker, whom we too, indeed, revere, is the most original of recent (*sic*) American economists, thinks also that President Walker's generation enunciated the truths we still must live by. It is not difficult, as may be imagined, to hang an ethical discussion on a settled group of economic truths; he is simply the good man who believes and acts in conformance with them. Pursuit of the derived precepts may be informative. Here is a group of them.

". . . under ordinary circumstances and under the conditions of the modern state, the common interest dictates respect for the legal rights appertaining to private property in land" (125).

". . . commercially, interest is justified since it represents the price of an arrangement mutually convenient to borrower and lender. . . . Equally is interest morally justified, since so far from being the monstrous progeny of an unnatural union it is merely a particular illustration of the general law of time-value" (139).

". . . For the business man of exceptional ability hardly any material reward can, under the conditions of modern industry, be extravagant" (149).

". . . Their [the workers'] best efforts may be, and sometimes are, impeded by unskillful management, by the stupidity or indolence of the entrepreneur, but the amount of the wages-fund, and, therefore, the rate of wages, depends primarily upon the productivity of labor" (162).

". . . It would seem reasonable and safe to leave the determination of value to the operation of economic laws. . . . Those laws operate over the whole of a vast area of trade, save only in an obscure and relatively unimportant corner; and their operation is in the main consistent not only with law but with equity" (181).

". . . About the application of principles to practice there may indeed be legitimate difference of opinion; but the principles themselves are immutable, and a clear apprehension of them is essential alike to intelligent criticism and to right conduct. No man is adequately endowed for the day-to-day duties of citizenship, much less for the direction of commercial or industrial enterprise, who is content to remain ignorant of the laws of value, or the theory of money" (197).

"It is quite conceivable that it may stimulate productive labor to permit a considerable latitude in expenditure to those who succeed in the economic race. To incite the industry and then deny to the industrious the fruits of toil, even if the fruits be over-rich and over-abundant, would be as absurd ethically as it would be economically disastrous. . ." (224).

"It is a fallacy to imagine that the most selfish of millionaires can monopolize the advantages of the wealth he creates or possesses. He can only utilize it by sharing it; unshared it is as dust. And this from no motives of altruism, but under the stern law of economic necessity" (273).

The stimuli to critical effort in this series of pronunciamentos are so varied and so outrageous that one is impelled, after thought, to let most of them pass unchallenged to die in the desert wastes of their own making.

IV.

The ethics here are largely distributive ethics. This is bound to be so. For his theory of consumption, like his theory of production, is as rudimentary as those current forty years ago. He clings to entrepreneurship as a reality and would have it that entrepreneurs are guided by their sense of "stewardship" which all "right-minded" men possess. The specific difficulty with a distributive ethics is, of course, the danger of crying over imaginary spilt milk. For the shares of income do not fall into the same categories they were imagined to fall into a generation ago. And justification of them as ethically sound is lost labor. The end of these categories was inevitable as soon as it came to be admitted that they were the prices paid for the services of the factors of production. For this started a search for the real factors of production and it very soon became apparent that a price need only be paid for something for which an incentive was needed. In entire disregard for economists' sensibilities markets organized themselves in the business system for the purpose of making manifest these incentives and paying over the price required. It is worth noting that the real incentives of industrial life are made of real income, not money income. But

modern processes are so complex that real incentives can only be supplied through a valuation and pricing process which is very crude and which is extremely liable to abuse by clever manipulators. It follows that goods-incentives are not nearly so effective as could be wished; and a premium seems sometimes to be put upon market rigging—even withholding—rather than upon the goods-making efforts that the markets are intended to be a mechanism for encouraging. Nevertheless, the apportionment of society's gross income takes place in society's markets where valuations are made. This supplies the key to the modern theory of distribution. But it makes the simple categories of nineteenth-century economists seem somewhat infantile; and clinging to them at this late day can only be attributed to a stubbornly arrested development.

V.

Nothing has been said concerning the ninety-nine hundredths of the book that consists of the development of Mr. Marriott's economic theory. Of it there is very little to be said. It is done very much better in any college text. The treatment here is much abridged, is complicated by long discursions into economic history and is altogether unsuitable for the reader who has been unread hitherto in economics; for the person familiar with economic literature there is interest only in the moral tags. Those we have already discussed: but it is difficult to leave the book without starring one notion that is not peculiar to the author, but is still an underlying fallacy in wider fields of primitive thinking. It happens to be stated here in such an extremely crude form that it displays itself in all its hideousness. Most economists have at least the grace to gloss it over. To quote: "Work in itself is not economically desirable. It may be morally beneficial to character . . . and for the well-being of society . . . but economically work is not a good but an evil. . . . It is true that there are some exceptional individuals who . . . like work for its own sake; but that is not the natural instinct of mankind."

It is not necessary to discuss this matter extensively, for the idea is already anachronistic. But we may return to say again that human nature revolts against the modern *conditions* of work, not against work itself—and, perhaps, further, that we may learn how to reconstruct industry from a study of the kinds of work men like to do. Work ought not to be only a Christian discipline, teaching men humility and forbearance; indeed modern unrest is a measure of our impatience with a system that has made work that. Bread is bitter, too, that is wrung out of men's reluctant bodies; it is also

unlovely, as Ruskin insisted. Humanity will not tolerate it long; and economists will do well to throw over the effort to sweeten the bitterness and temper the ugliness by supplying vicarious milk-and-water rationalizations to the workers of the world. It would seem plain enough that what we have got to do is to remake the modes of work, not to accept the old ones as character builders because they hurt the spirit. It is all very well to make virtue of necessity, but this is going a bit too far.

VI.

The essential difference in the ethical viewpoint of economists who cling to natural law and develop systems of principles, and those who frankly are not interested in principles, but only in theories and eventuations, might be summarized by saying that the orthodox put the matter this way: where we have got to go and what we have got to do to get there; the rewards and penalties of conforming or not conforming. And that the younger group would rather say: where we ought to go and what we ought to do to get there; what system of rewards or penalties seems to offer the best chance of getting people to contribute to it.

VII.

It is useless to speculate upon the motives of the long line of thinkers who brought economics to be a classical absolute with categories so rigidly delimited as to pass for a long time as natural laws. The most likely reason seems now to have been the lively desire they had to gain recognition for this particular discipline as a science with all the attributes of the then-dominant natural sciences. A foundation in natural law was a first requisite; a second was the ability to show that all phenomena in the field were governed by these laws. As it happened, natural laws, even in physics, chemistry, astronomy, and biology, have not been able wholly to withstand the battering of the experimental method with all the latter-day apparatus of the experimenters: so many phenomena fail to fit hypotheses. How much worse has it been for economics! It is literally true to say that all the fundamental propositions of the classicalists might now be reversed and sufficient evidence adduced to prove them by the same methods that are usually resorted to in substantiation of orthodoxy.[2]

The utter destruction of the pretensions of economics as a natural science have left the way open to a new generation who pro-

[2] For an exercise of this sort see John Maurice Clark's "The Socializing of Theoretical Economics" in *The Trend of Economics.*

pose, most of them, to recognize their endeavors as based upon moral motives, taking over from the sciences, however, what they can of the experimental method. The difficulties are obvious, with the whole modern world, going about its complicated affairs, as subject-matter; and with the obvious impossibility in most cases of controlling experimentation. Nevertheless, unless economists are willing to give up all pretense at productive endeavor, they find themselves committed to the method, difficulties and all. There remains a very large area, of course, that answers to none of the tests of science in the present state of our knowledge. This might not be so if the old psychology, biology, anthropology, physics, and chemistry had not opened at their most important seams and sunk the "social sciences" along with themselves. But who now has the temerity to make a pronouncement about, say, men's motives: and if we are not sure of motives how can there be any certainty about the incentives needed for economic endeavor. Or who would speak with the assurance of doing anything but making an hypothesis concerning discoveries of power resources during the coming decades: and how, then, can one say that there is any natural ratio existing between production and population?

VIII.

The thing is absurd. And the most we can do is to put our best ethical foot forward and say what institutions, in the light of our present knowledge of human nature, we should like to see develop around mankind; and then use all our considerable equipment for quantitative measurement to project the alternative results of proposed programs.

Such work as Marriott's, if it only pinned moral approvals on economic developments, would be bad enough, though it must not be forgotten that experimental method in social science has to accept developments that do occur (it does, however, attempt to measure and guide). But Marriott pins these moral approvals on unreal categories, on forces that do not exist now if ever they did.

The orthodox economists were—most of them—less consistent and therefore more useful citizens. They kept their moral speculations out of economics because they had the sense to see that their economics had nothing to do with morals either in premise or in consequence. It is like coming into a fresher world to read their moral essays—and they almost invariably came around to writing them. I am overwhelmingly tempted here to quote William Smart, that most regular of Scotch economists. In late life he faced certain moral issues in his little *Second Thoughts of an Economist*. He concludes, as an economist, it will be remembered, that vast classes of society can never be much better off materially, that class divisions

will persist and that natural laws not only limit production, but guide distribution according to "economic worth" (productivity). But as a moralist he breaks clean away and asks himself what is the *purpose* of life. He feels that there are two possible answers,[3] according as one believes in a future life or does not. If one does, he says, "every man's life here should be such as will land him at heaven's gate ready to go on as he has been doing." That is, regardless of economic law or any other law he is ready to say that we have an obligation to pitch men's lives at that level and that we fail as we fail in this. If one does not believe in a future life, he says, and does not find a purpose there, nevertheless, man has made his own purpose which President Wilson stated: "The service of humanity is the business of mankind." And if industry—the whole system of it—does not serve humanity well, revolutionize it. And here he gives up his distributive ethics and goes over to an ethics of production: "I must say that all our accumulations of wealth are little to the purpose of life if they do not tend towards the giving to all men the opportunity of such work as will have its reward *in the doing.*" The italics are his own and show his comprehension of the revolutionary implications of what he was saying. For it means the end of monotonous factory work, perhaps of offices, perhaps even of our great market cities. But we are obliged to think of the men who work, for, "what a caricature of existence theirs is to us who find the day all too short for the delights of mere living and *working* . . . if we could see that the claim of man on his fellows is not a high wage nearly so much as work that will 'make a man' of him, we should see, I think, that, in the further evolution of the economic life *on the same lines as in the past*, there is little hope of a future where there will be . . . free, happy life for all." And as the upshot of it all, in spite of Smart's almost studied complacency with things as they are—he was always impressed with the "sacredness about a system which has made us worth £2,000,000,000 a year, and has put not only living but comfortable living within the reach of many"—he was driven to say—as a moralist now—"Here, then, are two answers as to the purpose of man's life. They both come to the same issue. Whichever of them we adopt we have grave reason for dissatisfaction. If the present life be preparation, then there are more occupations than one would like to count which are no preparation at all for anything further—many of them, indeed, hindrances to any conscientious living even in the present. If life be an end to be judged by its happy activities, it is, thus far, a failure as regards immense classes."

[3] Chapter III of *Second Thoughts of an Economist.*

IX.

Most younger economists would not trade this little book written at the end of life, falling clean outside the system of his theory for all the erudition of his *Distribution of Income* or his *Theory of Value*. And this is, I think, because it is here that he comes to grips with the moral questions that have to be settled *first*. If we want life to be pleasant for men their work has to be reconstructed. We have some hint of the direction of reconstruction from the professed happiness in their activities of such men as Professor Smart. If these determinations are science then economics is a science, but we should have to admit it to be a "moral science." "Why, though, should we have to *admit* it? It seems to me a source of pride and strength, of renewed streams of vigor. We might *proclaim* economics a moral science and gain, not only in reality of description, but in the adherence of younger workers, and in the respect of fellow intellectual craftsmen everywhere.

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BOOK REVIEWS

The Psychology of Reasoning. EUGENIO RIGNANO. New York: Harcourt, Brace and Company, Inc.; London: Kegan Paul, Trench, Trubner and Co., Ltd. 1923. Pp. viii + 395.

Dissatisfaction with the poverty and incompleteness of the current literature on the reasoning faculty led Professor Rignano to write the present volume. Such dissatisfaction is justifiable in so far as it is directed towards strictly psychological works, but surely something may be said by way of exculpating those writers of logical treatises who incur an equal share of condemnation. It is the proper task of psychology to explain the structure and development of the different processes of psychical life, a task which logic is not fairly called upon to perform. Given the results of the psychological analysis, with particular reference to the reasoning faculty, logic proceeds to investigate the ways and conditions of operation of a faculty so constituted, to deal with the function of reasoning in the discovery of truth. Psychology is interested in reasoning for its own sake and in relation to the whole life of the organism; logic is interested in reasoning in its relation to truth; the two are interdependent but different. What Professor Rignano deplores is the absence of a study of reasoning at once psychological and logical, an omission which he proceeds to correct very ably and thoroughly. In this process of correction he gives us in point of fact a complete

psychology though he is avowedly concerned with a single mental phenomenon, reasoning. This extension of the subject-matter is the result of his view of reasoning as a highly complex process calling into unified play virtually all the modalities of mental activity. Previous interest in biology and physiology makes the work a study in comparative physiological psychology with numerous references to the lower organic world.

A phylogenetic account of reasoning in its development from the "recepts" of animals to the abstract thinking of man emphasizes the fundamental importance of desires and needs (affective tendencies) in directing the thinking process. Attention, the *sine qua non* of reflective thinking, is described as a state of "double conflicting affectivity," *i.e.*, attention is a conflict between the desire to reach a conclusion and the fear of being mistaken in such a conclusion. Reasoning is an integrated activity of the satisfaction of desires and of the impression of external stimuli on the sense organs reflected in the brain: it is fundamentally an affective process. The affective tendencies supply the interest in results, attention, vividness of imagination, connection, inhibition of extraneous interests, that are so many modifications of the total process. In its thus complex operation reasoning is defined by Professor Rignano as " a series of merely imagined experiments." It is a mental combination of the results of experiments actually performed in the past, and recorded mnemonically. As every step in an act of reasoning is the result of an actually performable experiment, Professor Rignano can offer a ready solution of the difficult problem of the relation between thought and reality. He puts the solution succinctly. "But the problem vanishes when we understand that the logical process is nothing else than a series of experiments, all, theoretically at least, capable of being performed, but limited to thought only in order to economize time and energy. The logical process appears then *to be identical with the perceptual reality itself*" (p. 83). We have performed the various experiments which are mentally combined; we can perform them again; we refrain from doing so to economize time and energy. But does not reason thus lose its dignity and become a mere handmaiden of the laboratory? If it operates exclusively on the results of past experiments, how can reason create anything new, how can it make any discoveries? Professor Rignano here replies that the very act of combination necessarily yields a product that is a new fact. Just as the elements with which the chemist deals are very different in isolation from their combined nature, so the results of the mental chemistry of reasoning are quite different from the single elements. Reasoning is interested in the succession of phenomena, in creating "histories of things."

This is the traditional defence of the syllogism which Professor Rignano is elsewhere not particularly concerned to defend, but it is equally valid for any form of reasoning. What he is concerned to do above all else is to keep reasoning concrete and empirical, in close contact with reality at every step of its unfolding. The correspondence with reality, the "logicality," is guaranteed by the secondary affectivity; the imagined materials and their coherent manipulation are provided by the primary.

The remainder of the book is devoted to a study of the higher forms of reasoning and of its abnormal manifestations. This discussion, with many examples both practical and theoretical, furnishes abundant evidence in confirmation of the view outlined above. Throughout the course of its twofold development from concrete to abstract and from intuitive to deductive, reasoning never once plays false to its affective nature. On the contrary, the higher we proceed in the evolutionary scale the more clearly do we see the affective drive in reasoning. To be sure, our affectivities become correspondingly less concerned with immediate satisfactions of physical needs and more concerned with the satisfaction of those larger desires for knowledge, yet, even here, true to the scientific ideal, much of this desire to know is in effect the desire to control physical nature for immediate use.

Particularly interesting in the development from concrete to abstract reasoning is what Professor Rignano calls "affective classification." Concepts, according to him, are groupings of objects affectively equivalent though perceptually as different as you please. These groupings, concepts, proceed through the utilitarian or technical to the strictly scientific or conceptual terminology. Correlative to this increase in abstractness is an increase in the deductive character of reasoning. Facts at first sufficiently concrete and few to be grasped by a flash of intuition, by their subsumption under conceptual groupings become so complex and numerous that the more studied process of deduction has evolved to make it possible for the mind to comprehend the given data. Intuitions are individual *"Gedankenexperimenten"*: deductions are schematized *"Gedankenexperimenten."* Schematization implies symbolization, verbal or graphic, an increasingly extended subsumption of individual objects under one abstract symbol. The best example of this growth of abstraction and consequently of symbolism is to be found in mathematical reasoning, on which Professor Rignano bestows many pages and much praise. In this prototype of constructive reasoning—in this sole type of "constructive" reasoning, one feels inclined to say after reading the highly eulogistic account of the creative achievements of this form of thought—there is a gradual symbolic progres-

sion from the concrete arithmetical operations of early peoples, through algebra and geometry, to the supreme abstractions of the calculus. In all these mathematical fields the reasoner is actuated purely and simply by his desire to discover the truth, which makes him only too willing to submit to the restraining influence of the secondary affectivity; the very intensity of his desire to succeed measures the intensity of his fear of being deceived, and his interest in achieving certain results never oversteps the bounds of propriety as fixed by the truth. Such is not the case, however, with that other higher form of reasoning, the "intentional," including dialectic and metaphysical reasoning. Here the desire to "present" the facts in a certain light, or to discover facts in support of a certain view, has replaced the disinterested love of truth and is so excessive as to completely disregard the counter-affectivity. Furthermore, the metaphysician owes the existence of his mental systems not only to a sentimental desire to preserve intact his most cherished ideals and aspirations in spite of the buffets of reality, but also to the very vagueness of the concepts with which he deals. But it is somewhat difficult to see exactly how such a metaphysical concept as "efficient cause," to which Professor Rignano takes such exception, is any more a "verbal *carapace*" than the schematized mathematical concept "unity," which, he says, is always "materially tangible." In his treatment of the relative merits of constructive (mathematical) and "intentional" reasoning, Professor Rignano seems to be something less than an unprejudiced scientific investigator. True, in what he calls "theological metaphysics" there has been much fantastic conceptual jugglery, but it seems unfortunate to include in a denunciation of all metaphysics a large branch of the subject that has little in common with the theological branch. Further, metaphysics may be quite as constructive as mathematics, frequently rather more constructive. In that synthetic variety of metaphysics which seeks to combine the results of the particular sciences, there is present an activity of combination quite as creative and quite as much in correspondence with reality as we find in the sciences themselves. Metaphysics is not at all committed to following the lead of creative, "scientific" reasoning, the results of which it merely classifies and "presents" with a certain *parti pris;* rather does it seek primarily to put together constructively the experimental results of the different sciences to get a view of reality as a whole. What Professor Rignano in point of fact objects to is the "nebulosity" of the older transcendental metaphysics, not to metaphysics as such. Metaphysicians, no less than mathematicians, may be positivists and synthetics, though they are frequently analytics, as is pointed out in the extremely interesting and enlightening chapter,

"Logical Types of Mind," in which a classification of individual affective differences in relation to different types of mind further attests the affective basis of reasoning.

Such attestation is also, perhaps best, seen in the pathological forms of reasoning. In this connection Professor Rignano makes an important contribution to the psychology of sleep and dreams. Considering these phenomena in their interdependence, he reaches the conclusion that "the functional rest of the mind during sleep relates only to the affective life" (p. 293). The furious and unimpeded activity of the intellectual elements—sensations and sensory evocations—unchecked by the affective elements causes the incoherence and illogicality of dreams. Dreams result from *"an affective sleep unaccompanied by a corresponding intellective sleep"* (p. 315); they are *"an anarchy of ideas due to the cessation of all affective government"* (p. 315). They are the random products of images called up strictly according to the law of the association of ideas, an association which patently falls far short of true reasoning. Professor Rignano quotes with full agreement: "The associationist psychologists," writes Toulouse and Mignard, "have shown us the mind as it would be without the forces of synthesis and direction" (p. 308).[1] Synthesis and direction are given to the mind by the affective tendencies, without which dreams are the mad things we know them to be. The same is true of relatively permanent madness, the only difference between insanity and dreams being the duration of the completely or partially un-affective state. In all these phenomena "mental equilibrium is only affective equilibrium." The paranoiac or monomaniac is the victim of mono-affectivism, and is hence perfectly coherent but highly illogical, for the primary affective tendency is so excessive as to overcome the critical effect of the secondary tendency. Maniacs and the mentally confused, on the other hand, are incoherent as well as illogical, due to their many unstable affectivities. Dements suffer from a complete non-affectivity.

A short chapter on "Unconscious Reasoning," in which a relational view of consciousness is put forward and a disbelief in the importance of unconscious reasoning is expressed, and a conclusion in which the results of the study of reasoning are claimed to point to its similarity to vital finalism, complete the book. In the conclusion Professor Rignano attributes the eternal struggle between science and religion to the "opposition between the essentially finalistic microcosm and the purely mechanical macrocosm" (p. 391). This finalistic character of the microcosm has been seen to be part

[1] E. Toulouse and M. Mignard, "L'autoconduction," *Revue de psychiatrie et de psychologie expérimentale*, Jan., 1912, p. 28.

and parcel of the mnemonic property of its affective tendencies which is at the same time the basis of its reasoning faculty.

Professor Rignano's book is a significant contribution to a generally neglected field of psychology. The greatest service it renders is the unification in reasoning of the phenomena of mental life. The analytic treatment of the interrelations of the components of reasoning serves to make each of these processes, as well as reasoning itself, the clearer. A great variety of practical examples gives the book an added importance and utility. The style is at times unfortunately involved and obscure; the sentences are often unnecessarily lengthy and loosely constructed. But such defects in expression are doubtless the inevitable result of a translation that attempts to be literal rather than clear. In any case they do not to any appreciable extent touch the serious importance of this remarkably comprehensive and enlightening study of a vital topic. They are mentioned as a suggestion that a better constructed translation of so valuable a book would be welcomed.

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Festschrift für Paul Natorp. Zum siebzigsten Geburtstage von Schülern und Freunden gewidmet. Berlin und Leipzig: Walter de Gruyter and Co. 1924. Pp. 240.

One's first impression of the book as a whole is its astounding variety of subject-matter. There is practically no philosophical topic that is not touched upon by the eight authors who have written this little volume in honor of Professor Natorp. We pass from an essay on education, by Artur Buchenau, to Ernst Cassirer's very clear and original reflections upon mythology; then H. G. Gadamer lures us into deep dialectics, that we may watch the categories at their "spectral dance." Then we find Albert Görland combining in his contribution (under separate headings) a general critique of Helmholtz's epistemology, and a redefinition of blessedness; this is followed by Nicolai Hartmann's attempt to reconcile ontology with Critical Idealism, and thereupon succeeds Richard Hönigwald's brief but significant discussion of the Atom as logical and scientific concept. From this we turn to philosophy of religion, guided by Heinrich Knittermeyer, and at last the Philosopher's Progress ends in the divorce court, whither we are led by Rudolph Stammler's distinctly legalistic survey of holy matrimony and the conditions for its annulment.

In Ethics, these several writers (with the possible exception of Stammler) all show a striking similarity, which marks their relation to Natorp and the Marburg School: a strain of individualism,

strongly brought out by Buchenau's plea for a more intellectual type of education, "an education for culture, not for civilization,"—and also by Görland's conception of ethics as esthetics, as "the style of the personality." In the present age of democracy, when the individual is valued only as useful or burdensome to society, these are voices crying in the wilderness; and they have the haunting insistence that voices in a wilderness are apt to have.

In epistemology, too, there is a general agreement among the authors. Gadamer's dialectics, Görland's critique of Helmholtz, Hartmann's ontological conclusions and Knittermeyer's somewhat cryptic utterances concerning "dialectic theology," all presuppose an idealistic *Weltanschauung*, or more precisely, the neo-Kantian metaphysic of Cohen and Natorp. Without a general faith in dialectics, such an epistle as Gadamer's "On the Idea of System in Philosophy" is scarcely comprehensible at all; the same holds for Knittermeyer's "The Transcendent and the Transcendental." This peculiarity serves to limit very considerably the circle of readers to whom the volume can appeal. On the other hand, it makes the book truly representative of the Marburg School, and renders it all the more appropriate to its avowed purpose, to honor one of the founders of that School.

The most original (and incidentally, least Neo-Kantian) essays are Cassirer's on mythology and Hönigswald's on Atoms. Cassirer rejects the generally accepted interpretation of mythology as a system of symbols for reality; his theory is psychologically subtler, namely, that the mythological forms are symbols, but the "mythological consciousness" is not aware of their character—the primitive myth-believing mind *confuses symbol and meaning altogether*, apprehends them as one, and so ascribes to both the same type and degree of "existence" or "reality." Some of Cassirer's reflections on the fundamental concepts and forms of mythology show an unexpected and probably unrecognized resemblance to the observations of the psycho-analyst, C. G. Jung.

Hönigswald's article is notable for its brevity, clearness, and literary ease. It attacks the notion that a concept such as that of the Atom may be classed as a "mere fiction," yet used in a system that pretends to describe the existent. Its relation to the existent makes the notion of existence necessary to its significance in the system. There is much in this little essay which is too mathematical for the lay reader, but the central idea is perfectly intelligible, notwithstanding the author's technical background.

If our first impression of the "Festschrift" is one of extreme variety, the last is one of remarkable unity. There are few groups of philosophers in the world whose outlook is as homogeneous as

that of Professor Natorp's students. Neo-Kantianism manages to unite and reconcile education, ontology, physics, religion, dialectics, and divorce. It is a considerable triumph for any metaphysical system, to embrace so many phases of this disjointed world in its unifying perspective.

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Das Naturgesetz. Ein Beitrag zur Philosophie der exacten Wissenschaften. BRUNO BAUCH. Leipzig and Berlin: B. G. Teubner. 1924. Pp. vii + 76.

The substance of this treatise is taken from an essay published in the *Kant Studien* (Vol. XIX, p. 303–337). Conformity to the laws of nature is not an object of inquiry for natural sciences, since it is on the one hand their presupposition, and on the other their aim. Since any inquiry into the nature of scientific presuppositions and aims belongs to the theory of science or epistemology, it is obvious that the problem of natural laws is of strictly epistemological significance. It was Kant who first in a fundamental way took up the question of conformity to laws of nature in connection with his attempt to lay an epistemological foundation for the possibility of natural science. Determination of natural phenomena, according to him, is only possible under the positive condition that they conform to certain rules. A scientific judgment concerning nature already implies rules, that is, regulative principles, for a possible presentation of natural phenomena. Determinateness as an objective element in any scientific analysis of natural phenomena is, however, not to be confounded with the subjective element in the ascertainability of anything whatsoever. Natural phenomena are ascertainable, so far as they are indeterminate, but this they are only in relation to reflective thought; however, in order to become ascertainable they must already be determined by rules. Objective validity for rules governing natural events is thus established. Therefore, conformity to rules has apparently as much objective validity as conformity to natural laws. Since, according to Kant's definition, a natural law is a rule having objective validity, objectivity as a *differentia specifica* between law and rule is hopelessly deprived of its differentiating function. This fundamental difficulty is solved by introducing the concept of order or relation. A natural law is an objective order, constituting natural phenomena, and as such it can only be disclosed or discovered, not invented or created. Rules, however, are neither objective nor subjective, they are objective assignments of subjects for subjects; their objectivity is *quasi* objectivity, because related to subjectivity. In the solution of this difficulty lies Bauch's point of departure for

his interesting exposition of the transcendental logical contents of natural laws. It is in the system of categories in its chief mathematical and dynamical divisions that the fundamental logical presuppositions of natural law are found. Never does a single category determine a natural law, but always a plurality of them, constituting definite transcendental logical unity, such as the correlative union of substantial reality, extensive and intensive quality, *etc.* Natural laws, while showing correlative categorical associations, presuppose a system of categories as their universal logical basis, which must be a transfinite system, not merely an infinite system, corresponding logically to the infinity of the problem of scientific knowledge. Rejecting the finite interpretation of the categorical system of Kant, Bauch claims actual infinity (Cantor) and, as we may add, "objective" infinity, for the systematic categorical unity as such, avoiding thereby the doubtful neo-Kantian (also Platonic) theory of conceptual transformation.

If natural laws are general categorical forms or relations, then it is obvious that they can not be themselves singular phenomena, natural objects or events. They are, as Helmholz had correctly stated, general conceptions of species, notions of a hypothetic nature (Lotze), and as such they conceptually represent the respective phenomena under the explicit conditions expressed in the laws themselves (they never tell what happens, but only what should happen). Laws of nature are concepts, or rather segments of concepts, since they bring homogeneity into the diversity of peculiarities, that is, they constitute singulars out of particulars. This signifies that the underlying principle of their specific conceptual character is their function. From the viewpoint of a general functional theory of concepts, which supplants the traditional theory of abstraction, laws of nature appear to be a kind of second universality subordinate to the basic universality of the concept, which, being the law of divergent particulars, determines their convergence, thus creating the conditions under which particulars are determined in conformity to natural laws. "It is the concept which gives nature its law" (Kant). Conformity to laws of nature is, therefore, a particular universality embued with the basic universality of the concept, but only particular in so far as it is differentiated, not separated, from conceptual universality. A better epistemological survey of the problem of natural conformity to law from the transcendentalist logical standpoint is hardly to be desired. On the whole, it is, indeed, a splendid introduction into the difficulties of epistemological research.

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NOTES AND NEWS

As part of the program of the meeting of the Taylor Society in New York, December 4–6, 1924, there will be a session on Industrial Psychology on Friday, December 5, at 8 p.m., at the Engineering Societies Building. There will be two papers. "What Industrial Psychology Asks of Management" by W. V. Bingham, and "The Bases of Industrial Psychology" by Elton Mayo, followed by a discussion led by Frankwood E. Williams, Elliott Dunlap Smith, and J. McKeen Cattell.